BERMUDA

ANNUAL REPORT

OF THE

DIRECTOR OF AGRICULTURE

FOR THE YEAR

1960

COMMONWEALTH
17 JUL 1961

BERMUDA

ANNUAL REPORT

OF THE

DIRECTOR OF AGRICULTURE

FOR THE YEAR

1960

BOARD OF AGRICULTURE — 1960.

C. VAIL ZUILL, Esq., M.C.P., J.P., Chairman

WOR. L. R. SELLEY, M.C.P., Deputy Chairman

W. T. WILSON, Esq.

G. TUCKER, Esq.

S. JOHN PYE, Esq.

J. B. FERGUSON, Esq.

E. R. OUTERBRIDGE, Esq., M.C.P.

J. S. HALL, Esq.

P. J. C. SMITH, Esq.

MICHAEL DARLING, Esq.

H. RICHARDSON, Esq.

DEPARTMENT OF AGRICULTURE

GORDON R. GROVES, A.H.; R.H.S. ..... Director of Agriculture

I. W. HUGHES, M.Sc. (Agric) ..... Assistant Director of Agriculture

C. W. BROWN, B.Sc. M.R.C.V.S. ..... Government Veterinary Officer

E. A. MANUEL, B.S.A. ..... Plant Pathologist

J. H. JONES ..... Horticulturist

C. V. S. EARLY ..... Agricultural Officer

T. A. HOLLIS, M.B.E. ..... Agricultural Officer to 27th Oct. 1960

F. C. HOLLIS ..... Agricultural Officer

D. J. MOORE .. Reafforestation Officer; Agricultural Officer from 28th Oct. 1960

J. F. KING ..... Reafforestation Superintendent

L. E. TAPSELL ..... Reafforestation Superintendent

E. E. SHEPPARD ..... Marketing Officer

R. M. SHASTRI ..... Assistant Marketing Officer

MRS. J. KING ..... Clerk

MRS. R. BARTON ..... Accounts Clerk

MRS. A. SIMONS ..... Exhibition Secretary (part time)

Other employees including foremen, mechanics, gardeners and reafforestation workers: 100

REPORT

of

The Director of Agriculture, 1960.

The Chairman, Board of Agriculture:

I have the honour to submit a report of the Department of Agriculture for the year 1960.

I. AGRICULTURE IN 1960.

Despite the difficulties due to the loss of grazing and arable land for building purposes, agricultural production was generally well maintained during the year under report. The dairy herds produced over 58,000 more gallons of milk than they did in the previous year. Other products were up to average. The farm value of milk was £204,138, eggs £174,500, meat products £30,332, vegetables, fruit and flowers £221,359, making a grand total of £630,329.

Vegetable Production:

The production of vegetables was reasonably well maintained throughout the year. Produce to the value of £60,000 was purchased by the Government Marketing Centre, compared with £64,000 in 1959. The potato crop of 1960 fell short of the 1959 figures by some 4,000 bushels. Again, restrictions were placed on the importation of fresh vegetables when local supplies were adequate to fulfil requirements. These restrictions were enforced under the Importation of the Fruit and Vegetable Act 1958.

Fresh Bermuda grown vegetables find a ready sale throughout the Colony, despite the competition from imported canned and frozen vegetables. The peddlers, with their attractive displays of fresh fruit and vegetables on their horse or motor drawn vehicles have done a great deal to bring Bermuda vegetables to the attention of the housewife.

The Easter Lily Trade:

Some improvement was shown in the export of lily flowers in 1960. The declared Customs value of the flowers exported was £10,488 compared with £5,593 in 1959. Unfortunately, this is still less than one third of the business conducted in 1957.

The Department's lily improvement scheme continues to expand, with promising results.

Citrus Culture:

The citrus crop was not so heavy in 1960 as in previous years. The trees were heavily infested with rust mite, which is largely attributed to the excessively wet weather during August, September and October, for rain fell on 15 days in August, 18 days in September, and 20 days in October. This considerably reduced the number of actual days on which spraying could be undertaken. As a result of this rust mite infestation, the appearance of the fruit was exceedingly poor. Despite this fact, the importation of grapefruit was prohibited with effect from 20th December 1960, and it is expected the crop will last until late March or early April 1961.

The demand for locally budded citrus trees is still very keen. The Department sold 900 budded trees in 1960.

Dairying:

Returns from the three pasteurising plants reveal that the dairy farmers produced 720,489 gallons of milk throughout the year under report, which is 58,965 gallons more than in 1959. This is a remarkably fine achievement, in view of the limited pasturage. The Department of Agriculture is very concerned with the over grazing of pasture land. Severe soil erosion is taking place in certain areas. It is thought that a method could be devised to divide the pasture land into smaller units to facilitate rotational grazing, but this presents considerable difficulty on many of the small farms. Most of the soil erosion is taking place in the vicinity of the milking sheds, where the cows have to congregate at least twice every day. The subject is being given further serious attention.

Poultry:

The poultry industry has gradually been built up to an important business enterprize. The main egg production business is in the hands of eight people. The largest egg producer maintains a flock of 20,000 birds.

Other animal products:

Meat inspected in the slaughter houses amounted to 1519 carcasses of pork, and 369 carcasses of beef and veal. In addition, 29 goats and 9 sheep were slaughtered for meat.

Apiary culture was maintained at about the same level as the previous year. There is a ready sale for local honey, but bee-keeping is only practised by a few enthusiastic bee-keepers.

Spraying services:

The two spraying machines operated by the Department of Agriculture applied 194,990 gallons of spray to farm crops, citrus and ornamental plants in 1960. The lower gallonage compared with the previous year, was due to the wet weather experienced throughout the autumn months. As a result of this wet weather, it was impossible to apply the fifth spray to the citrus trees. The demand for farm spraying was heavy, and it was often difficult to keep up with requests for service during the peak of the potato growing season in the Spring. The purchase of a new 300 gallon sprayer mounted on a Commer truck, will help to ease the problem in 1961.

II — REAFFORESTATION SCHEME — PARKS DIVISION

The Board of Agriculture continued the policy of removing dead trees from areas which are conspicuous from the public roads. Several such areas were selected. Less time, however, was spent in felling dead trees, because of the ever increasing maintenance work in the Parks Division.

Felling dead trees:

During 1960, 10,000 dead trees were felled in Southampton, Paget, Devonshire and Smith's parishes.

Planting:

Over 8,000 trees, shrubs and palms were used in the various planting schemes undertaken during the year.

Maintenance of Roadside Planting and Hedges:

One case of vandalism was reported in Bernard Park where ten Casuarina trees were severely damaged. It was pathetic to see branches of these graceful trees ruthlessly torn off. However, it is thought that people are beginning to take a greater pride in the roadside plantings, because wilful destruction is far less than it was several years ago.

The maintenance of hedges throughout the Colony, continues to present a problem. While more time is being spent in trying to get the hedges in a presentable condition, it is a long and tedious task. Growth of many of the hedges was excessive throughout the summer months, again, due to the wet weather. Thought is being given to speed up the operation by further mechanization.

Wayside Parks and Ornamental Planting:

The many favourable remarks heard in recent years of the improvement to the countryside by the development of the wayside parks and gardens is most encouraging. These parks have been kept as natural as possible, conserving wherever possible the natural vegetation. The most formal of the parks is the Trimingham Road sections, where the round-a-bouts are replanted frequently with flowering plants, to provide a good display of colour to this important approach to Hamilton.

This Department now maintains 93 separate areas of parks and gardens, with a total of 135½ acres. This figure does not include the School playing fields and grounds, Government House Garden, Montpelier Arboretum, and the Botanical Garden. These areas account for another 105 acres, which gives the Department of Agriculture a total of 240½ acres under their control and maintenance.

Easter Lily plantings:

The planting of six acres of land in five parishes with Easter lilies by the Department of Agriculture, was continued. All the plots are visible from the public roads and the flowers are left on the plants for the benefit of the tourists.

III. ENTOMOLOGY, PLANT PATHOLOGY AND OTHER INVESTIGATIONS

The following summary of the Annual Reports of the Assistant Director and the Plant Pathologist give some idea of the investigations carried out during the year.

Spittlebug — Clastoptera undulata Uhler:

First recorded in Bermuda in the summer of 1959, the spittlebug continued as the major entomological problem in 1960. The favoured hosts of **Clastoptera undulata** are Casuarina spp; the dominance of these trees in newly reafforested areas in the Colony intensified the potential danger of the spittlebug.

The reports of Mr. A. G. Dustan, and those of the Plant Pathologist for the year 1959, gave information on the initial studies carried out on the spittlebug. The publication "The Spittlebug, **Clastoptera undulata Uhler** in Bermuda" by A. G. Dustan is an excellent summary of spittlebug investigations up until March 1960. It was at this time that the Assistant Director Mr. I. W. Hughes, took over the major share of the spittlebug work since Mr. Dustan was shortly to return to Canada. For the remainder of the year investigations involving the spittlebug were carried on in three principal areas, these being (1) Population trends and life history studies; (2) Biological Control; (3) Chemical Control.

(1) Studies of the life history and population trend show that due to the winter of 1959-60 being a fairly mild one, with little wind, and an unusually low rainfall, the spittlebug was able to maintain itself at a reasonably high level. There was a steady decline in the number of spit masses per observation branch nevertheless. Strong winds accompanied by the winter's lowest temperature were experienced in March, and these conditions brought a very sharp drop in the number of spittle masses. The combination of the low temperature and high winds seemed to be partially damaging to the spittlebug nymphs since it dessicated the spit masses, leaving the nymph to perish.

In several of the observation sites **Clastoptera** was virtually eliminated as a result of the March weather. From a low of fewer than five spit masses per branch, in April the figures increased steadily during the summer months, reaching a high in October at which time an average of nearly forty spit masses were to be found on each branch under observation. Very heavy rain during September and October appeared to have no adverse effect on population increase. By the end of the year the average number of spit masses have fallen to under fourteen, almost exactly the position to exist in January 1960.

2. Biological Control:

Shipment of **Carabunia myersi Waterston** an endo-parasite of **Clastoptera undulata** have been received from Jamaica at irregular intervals since December 1959. The fact that the adult parasite is very delicate and extremely short lived

(48 hours maximum adult life, 24 hours average adult life) has complicated the task of introducing Carbunia. Since the shipment of adult parasites is not practical, it has been necessary to ship parasitized nymphs of **Clastoptera flavidossa** on Casuarina foliage from Jamaica, and hold the material in emergence boxes in quarantine here in Bermuda. Parasites, on emerging, are collected and liberated in suitable sites in the field.

Despite many difficulties in dealing with these parasites, some encouraging results have been achieved. Recovery of larval and pupal stages of **Carabunia myersi** were made at two sites in June. During November, 20 nymphs were dissected from each of six separate areas where liberation of Carabunia had previously been made. Parasites were recovered in three of these sites.

3. Chemical Control:

Control experiments, utilizing malathion, dieldrin and methoxychlor, carried out by Dustan in 1959, demonstrated that any one of these materials would give excellent kill of nymphal and adult stages of **Clastoptera undulata.** The residual and ovicidal effectiveness of these materials was not clearly demonstrated since spraying was carried out during the winter months, when spittlebug activity was restricted. On August 30th, an experiment was begun to evaluate the effectiveness under summer conditions of the three insecticides mentioned above. All treatments except methoxychlor gave virtually complete initial kill, but the residual effect lasted less than three weeks in the best plot where dieldrin was used. It is possible that the very heavy rains in September reduced the effectiveness of all material in this experiment. None of the materials acted as an ovicide. The residual control that was exhibited by dieldrin was attributable to the killing effect of the insecticidal residue on newly emerged nymphs.

The Mediterranean Fruit Fly — Ceratates capitator:

Since the initiation of a control programme against the Mediterranean fruit fly in 1959, the number of these flies caught in baited traps have steadily decreased. Whereas damage by this pest was recorded in 25 citrus orchards in 1956, flies were trapped in only two orchards in 1960.

Traps baited with angelina seed oil were maintained in 22 different sites throughout the Colony during the year. Altogether 549 flies were trapped with all but two of these being caught at Sleepy Hollow, Warwick. Slightly more than 90 per cent of the flies trapped at Sleepy Hollow were caught during June and July. Two flies only were caught on a property in Paget during October.

Bait spraying and ground spraying were carried out at Sleepy Hollow. Subsequent to a thorough ground spray using Dieldrin 50% Wettable powder at the rate of 5 lbs. of actual Dieldrin per acre on the 4th July, only 7 flies were trapped at this property. There was no report of damage to citrus by the fruit fly during the year, neither were any reports received of damage to peaches. There appears to be only one centre of infection remaining — namely Sleepy Hollow. By following a strict trapping and spray programme in the Spring and Summer of 1961, it may be possible to reduce the fruit fly still further and perhaps even eradicate the pest.

The high cost of angelina seed oil, the attractant used in the first fruit fly traps, has led to the development of synthetic lures by American chemical houses. Supplies were obtained of four of these materials for trial.

Biological Control:

Of particular interest in this field is the success which the predacious snail **Euglandina rosea** is enjoying in Bermuda. This snail was first introduced in January 1958, when a small shipment was received from Hawaii. Subsequently, additional shipments were received and liberation made in several areas in the Colony. A large edible snail **Otala lactea**, which had become very serious pest in Pembroke and Smith's Parishes is much favoured by the predacious species. By the end of 1960, **Euglandina rosea** was very common around Tulo Valley, Spanish Point and in Harrington Sound, Smith's Parish. In these areas the edible snail is now difficult to find, having been virtually eliminated by the predacious species. The spiral snail **Ruminia decellata** is also attacked by **Euglandina rosea** but the reduction in number of this species has not been as striking.

Fewer shipments of parasites and predators of scale insects were received in 1960 than in recent years. This was the result of a decision made by this Department that priority should be given to the spittlebug problem.

Two small shipments of the thrip parasite **Dascyscapus harvipennis** were received from Jamaica through the Commonwealth Institute of Biological Control. The parasites were gathered and shipped in mummified host material. Emergence of adult parasites in Bermuda was poor, and only 10 parasites were actually released. Similarly a small shipment of parasites of the larval stages of the Canna leaf roller **Calpodes ethecus** was obtained from Jamaica, but only 5 adults were released.

Storage of Grapefruit:

In the winter of 1959 A. G. Dustan carried out a series of tests designed to provide information on the effectiveness of certain pre-storage treatment involving fungicides and fungicidal waxes, as well as different storage temperatures, in lengthening the storage life of local grapefruit.

The results of Dustan's experiments were published in the August 1960 Monthly Bulletin of the Bermuda Department of Agriculture. While certain difficulties were experienced by Dustan in the course of the tests (fluctuating temperatures in the cold storage rooms being the primary difficulty), the tests clearly demonstrated that pre-storage treatment of grapefruit with the fungicide Dowicide A No. Hexamine and/or the fungicidal wax, Florida Wax 101A was of great value in prolonging storage life of treated fruit.

To gather further data on ways of lengthening the storage life of grapefruit, another experiment was planned by Dustan and Hughes in March 1960. The experiment was drawn up with the following objectives in mind:—

1. To establish the relative effectiveness of several different treatments intended to improve the storage life of grapefruit kept under a controlled temperature of 50°F. (This temperature was selected, since, in the literature on Grapefruit Storage published in other countries, 50°F is looked upon as the optimum storage temperature).

2. To determine the maximum storage life of locally grown grapefruit, when held at a constant temperature of 50°F.

3. To gather information on the shelf life of grapefruit after removal from storage at a constant temperature of 50°F, for prolonged periods.

All fruit used in the experiment was carefully graded to eliminate those fruit which were not completely sound. Particular attention was paid to the elimination of fruit with stem-end damage. Grossly over or undersized fruit were also excluded from the tests. Eight different treatments were utilized in the experiment. All fruit were packed in standard cardboard citrus boxes of 4/5 bushel capacity. Diphenyl pads, when used, were placed inside the box, one pad beneath the fruit and the other above the fruit. After the treatments were completed, all the fruit were placed in a chillroom in which the temperature was 50°F.

The effectiveness of the treatments involved were evaluated in the first instance, over a four month period. At the end of that period one box of fruit from each treatment was removed from storage and held for 14 days under a room temperature of 70°F-75°F. On the first, seventh and fourteenth day after this fruit was removed from storage, examinations were carried out and taste tests conducted to determine the shelf life of the fruit.

Two weeks, and again at four weeks, after the end of the initial four month storage period, eight more boxes of fruit, one from each of the eight treatments, were removed from the chillroom and handled in the exact manner described above. In this way, data was obtained on the storage quality of grapefruit and the related shelf life of this same fruit for a period of five months. At the end of the five-month period, all remaining fruit in storage was held for one more month, then examined and decay records gathered, thus providing information on storage over a six-month period. The decay control varied from 24% to 87%. This is the amount which decay is reduced by the treatment, and was based on decay in untreated checks. There was surprisingly little difference in the decay

control achieved during the first 12 weeks of storage by the eight treatments tested. While results of this nature are not spectacular, they are, none the less, important. The fact that all fruit kept so well at 50°F, for such a long period, indicates that the temperature alone was sufficient to control decay among the fruit very effectively.

Throughout the experiment, the superiority in external appearance and quality of waxed fruit to that of unwaxed fruit was very evident. Waxing by itself was equal to, or better than, any other treatment in controlling decay during 16 weeks and was also one of the most effective decay control treatments when evaluated over a 26-week storage period. On the basis of these facts it would seem highly desirable to wax local grapefruit with Florida Wax 101A (or a comparable product) regardless of what other treatments might be considered.

The combination treatment of Dowicide A-Hexamine, diphenyl pads and wax was the most effective of all treatments in controlling decay during storage. However, the added expense involved in using the three agents is not justified unless very long periods of storage (five months or more) are contemplated.

The external and internal quality of all fruit stored for 16 weeks at 50°F was very good, and in the case of fruit receiving certain treatments the quality was outstanding. Waxing, and the use of diphenyl pads either as separate treatments or in combination produced the highest quality fruit. Attempts to evaluate the effect of various pre-storage treatments on the shelf life of local grapefruit were not successful. All that was obtained from this test was evidence that waxed fruit retained a high sale quality even after 14 days at room temperature, following long cold storage periods.

IV. HORTICULTURE.

It is gratifying to record a continual expansion of the horticultural activities. Both the Horticulturist and the Reafforestation Officer have been extremely active in their respective fields. Ornamental horticulture must obviously play a still greater role in the welfare of the Colony. New plants are being tried, which if successful will add a great deal of interest and variety to the gardens throughout the Colony.

Botanical Garden:

Further improvements were made in the Garden during the year under report. The garden for the sightless was completed, which will be formally opened in the Spring of 1961. The Botanical Garden has become a very popular centre for both visitors and residents; while no record is made of the actual number of people who visit the garden, the number must be very considerable. In view of the demand for an illustrated Guide to the Garden, a new Guide was written, and is now in the hands of the printers. It is hoped that this publication, which will include nine black and white plates and five coloured plates, will be on sale by the middle of 1961.

Montpelier Arboretum:

The development of the Arboretum in Devonshire is proceeding very satisfactorily. Plans have been made for a new entrance to be made from the Montpelier Road which will lead in to a car park. Paved walkways are also planned, but no motorized traffic will be permitted beyond the car park. The cottage in the grounds was completely renovated during the year under review, and a well was sunk. This well is 105' deep and yields excellent water. Many new trees and shrubs were added to the collection. A collection has been made of trees which yield suitable timber. These tree trunks are now on display in the Arboretum.

Tulo Valley:

Several improvements were made at the Tulo Valley nursery, resulting in more land becoming available for the propagation of citrus trees. Additional wind breaks were planted, which will not only protect the tender plants, but will also be used for demonstration purposes. The value of hedges as wind breaks cannot be over emphasised in places where wind causes considerable damage to plants in exposed situations.

Nursery Work including Citrus Propagation:

The total number of plants distributed from the Nursery throughout 1960 amounted to 33,265. Over 8,000 of these were used in the Department's planting scheme, and the balance either sold to the general public or donated to the Arbor Societies.

Citrus propagation was continued, but only 900 budded trees were ready for sale. This figure is considerably lower than the sales for the previous year. However, it is hoped that with the new land available for this work, that many more budded citrus trees will be available for sale in future years.

Trial Plots:

A vegetable trial plot was maintained in the Botanical Garden to test varieties, and for demonstration purposes. Samples of each consignment of seed potatoes were also planted to check the incidence of virus diseases.

Advisory Service:

As in previous years the Horticulturist undertook a considerable number of advisory visits. Many of these visits were in connection with giving advice on general landscape gardening problems.

School Gardening:

The Horticulturist continued to give talks to school groups. A number of the talks were given at the Botanical Garden. Regular visits were made to the schools taking an active part in gardening.

Arbor Societies:

General assistance to the Arbor Societies was given by the Department of Agriculture in the form of funds, plants and labour. Six Arbor Societies continue to be active, and their work is most commendable.

V. ANIMAL HUSBANDRY

Dr. C. W. Brown was appointed Government Veterinary Officer, and arrived in Bermuda on the 20th January, 1960.

Control of Animal Diseases:

The Government Veterinary Officer reports that of the 1489 bovine animals over the age of eight months, tested by the single Intradeanae Comparative Tuberculin test, 46 animals reacted positively to this test and were slaughtered. A post mortem inspection was made of each of these animals at the slaughterhouse, where typical tuberculin microscopic lesions were seen, mainly involving the respiratory system. Specimens examined by the staff of the Pathological Department of the King Edward VII Memorial Hospital were shown to contain typical tuberculin acid fast bacilli, which confirmed the presence of tuberculosis in the animals slaughtered. It was not possible to determine which strain of tubercular bacillus is involved; epidemiological evidence however indicated that it is bovine tuberculosis. The Government Veterinary Officer reports that no guarantee can be given that every adult bovine animal in the Island has been identified and listed. In addition to the difficulty of locating many privately owned animals, there is always the problem of illegal movement. To ameliorate the dangers of contagion associated with these privately owned cows, it is intended to rigidly enforce the Diseases of Animals Regulations, and to concentrate on the regular testing of every animal in the recognised dairy herds. At the same time every effort will be made to locate individual cows.

Several amendments to the Control of Animal Diseases Regulations 1947 were made during the year, amongst which was one to increase the compensation payable to the farmers whose cattle are slaughtered due to tuberculosis from £20-£50 per head.

Improvement of Livestock:

At the request of the dairy farmers, the Board of Agriculture approved a scheme for the Artificial Insemination of cattle. The Government supported the Board's proposal and allocated the sum of £1,100 to initiate the scheme. The Government Veterinary Officer visited various A.I. Centres in Canada and the U.S.A. when a decision was made to purchase the frozen semen from the Waterloo Breeders Association, Ontario, Canada. The necessary equipment was purchased and plans made to commence the Scheme early in 1961. The view has been expressed by Dr. Brown that providing the A.I. Scheme has the farmers full support, and they have sufficient patience, the scheme should prove totally successful.

VI. WHOLESALE MARKETING CENTRE

The Department's Wholesale Marketing Centre was moved from Front Street, Hamilton, to the cold storage plant at Prospect, with effect from the 1st January, 1960. It was thought at the time, that the Prospect site would not prove as successful as the Front Street location, but experience has shown that the site has made very little difference.

Consideration is also being given to the possibility of providing additional chill room facilities at Prospect, to compensate for the loss of the Front Street chill room, when the lease expires on the 31st December, 1961. The matter is being actively pursued by the Board of Agriculture.

Produce to the value of £60,000 was purchased by the Wholesale Marketing Centre during 1960, which was £4,000 less than the previous year. This reduction in purchases was due to a smaller potato crop. Unfortunately, the year's operation showed a deficit of nearly £5,000. This deficit does not include salaries etc., see "Appendix C".

A careful study of this marketing system was made by the Board and Department of Agriculture in an endeavour to correct some of the weaknesses of the system. The Farmers' Contracts are also under revision. Certain losses occur each year due to the market becoming glutted with specific kinds of vegetables. Without some form of outlet for the surplus vegetables, such as a processing plant, it is exceedingly difficult to avoid these periods of over production and consequent loss, but unfortunately the quantities available are not sufficient to warrant the setting up of a processing plant. Some of the weaknesses have been spotted, and as a result of this study it is hoped that in future years, the losses will be eliminated.

VII. AGRICULTURAL EXHIBITION

The twenty-fifth Agricultural Exhibition was held on the 21st, 22nd and 23rd April, 1960. This was possibly one of the best Exhibitions staged in recent years. The main contributing factor was the weather, which was fine and warm not only for the three days of the show, but for nine days prior to the opening. The attendance during the three days was 3,000 more than the previous year as is shown in the following table.

Year	Exhibitors	Entries	Paid Admission
1955	305	2000	9,957
1956	385	2450	14,400
1957	391	2486	10,500
1958	454	2585	7,800
1959	436	3061	10,255
1960	435	2229	13,000

Annual Citrus and Poultry Show:

The annual Citrus Exhibition and Poultry Show was held at the Botanical Garden under the auspices of the Citrus Growers Association and the Poultry Fanciers Society in the month of January.

VIII. EXTENSION WORK

Publications:

The publication of the monthly Agricultural Bulletin was continued, and the circulation remained at about 700 copies per month.

Other Departmental Publications included:—

"The Guide to the Botanical Garden"
by G. R. Groves. To be published in 1961.

"A Survey of Mist Propagation in Bermuda"
by D. J. Moore. (Written but not published)

"Some Natural Enemies of the White Peach Scale"
"Pseudaulacaspis pentagona (Targioni) Homoptera: Coccoidea in Florida"
by I. W. Hughes. (A paper published in the Florida Entomologist).

Lectures and Demonstrations:

Lectures were given by the staff, on agricultural and horticultural subjects to various organizations. Advantage was again taken of the time made available to the Department by the Bermuda Broadcasting Company on every second Wednesday of the month, to discuss matters of topical interest.

Agricultural Advisory Service:

One Agricultural officer was assigned the task of making regular visits to all the farmers to discuss current problems and to make a survey of the crops under cultivation. This information materially assists the Marketing Centre.

IX. LAND CONSERVATION

It is to be regretted that no further progress has been made in the conservation of arable land. Estates are being sub-divided at an alarming rate for the building of dwelling houses, and very little thought is given to the preservation of the arable land contained in these estates. The Board of Agriculture has given serious thought to suitable measures to preserve the land suitable for cultivation, but no support is forthcoming from the Legislature.

X. CLIMATOLOGICAL STATION

Rainfall figures have been kept at the Botanical Garden for many years, but apart from this no other Climatological data has been recorded. With the disbandment of the Bermuda Meteorological Station in 1958, there was no agency in the Colony keeping accurate climatological data other than the United States Air Force authorities at Kindley Air Force Base. Since the Department of Agriculture had acquired most of the meteorological equipment formerly owned by the Meteorological Station it seemed natural that this Department should make an effort to keep weather records.

In February, Mr. Frank Chasemore, a visiting Civil Engineer with the Public Works Department, and the Assistant Director of Agriculture, set up a weather station in the Botanical Garden, and from 1st March onwards daily records were gathered. With the facilities currently in service, it is possible to record (1) Maximum daily temperature (2) Minimum daily temperature (3) Wet and dry bulb readings (4) Daily rainfall (5) Barometric pressure. An automatic rain gauge, a micro baragraph, and a thermograph are also in use. Daily record sheets are kept, and the data summarized at the end of each month and published in the Monthly Agricultural Bulletin.

During the course of establishing the weather Station it became obvious that rainfall figures gathered by the Department of Agriculture in 1958 and 1959 were inaccurate. It was determined that the rain gauge used during that period was giving readings which were almost 25 per cent above the correct figure. A corrective factor of 1.23 was established as the figure by which the reading had to be divided to get the correct daily fall.

These corrected rainfall figures for the last three years are given below:—

1958 — 69.40 inches
1959 — 64.12 inches
1960 — 69.12 inches

The rainfall for 1960 was 11.48 above the normal yearly average. The Autumn months were exceptionally wet, with 11.9 inches in September, 8.96 in October and 10.36 inches in December, while the first four months of the year were dry so that by May there was a deficit of 6.72 inches.

XI. FINANCIAL.

From the financial statement, Appendix B, compiled from records kept at the Department of Agriculture, it will be observed that the total allocation of funds for 1960 was £209,332, of which £188,559 was spent. Departmental receipts, including the resale of vegetables purchased through the Wholesale Marketing Centre, and various receipts for services rendered to the public, amounted to £64,661 as shown in Appendix 'A'. If the receipts be deducted from the total expenditure the actual operating cost of the Department of Agriculture for 1960 was £123,895.

Appendix 'C' shows the actual cost of the Wholesale Marketing Centre.

XII. ACKNOWLEDGEMENT.

In bringing this report to a conclusion, I would like to record my sincere appreciation to the Chairman, and members of the Board of Agriculture, for their valuable help and guidance throughout 1960.

To the members of the staff of the Department of Agriculture, I likewise express my thanks for their loyal support and the efficient manner in which they have discharged their duties. My thanks are also expressed to the numerous members of the public, and especially to the members of the many organizations connected with agriculture and horticulture, from whom I have obtained much useful advice and information.

Respectfully submitted,

GORDON R. GROVES,
Director of Agriculture.

10th February, 1961.

APPENDIX "A"

Summary of receipts for year 1960.

Vote 2 (a)	Marketing Centre	£53,007 14 5
2 (b)	Service to citrus growers	6,280 0 0
2 (c)	Reafforestation services	1,890 16 0
2 (d)	Other receipts	3,482 15 8
		£64,661 6 1

APPENDIX "B"

Expenditure for period 1st January to 31st December, 1960.

Vote	Service	Amount of Vote	Expenditure	Balance Lapsing
1	Fees to members of Board	250 0 0	156 0 0	94 0 0
2-8, 10	Salaries, Established Officers	11,473 0 0	11,398 1 8	74 18 4
9	Special allowance to Mr. A. Hollis during work with Reafforestation	150 0 0	122 19 8	27 0 4
11-15	Salaries non-established officers	6,832 0 0	6,574 2 1	257 17 11
16-17	Non-pensionable allowance and bonus at the rate of 25%	4,577 0 0	4,501 19 7	75 0 5
18	General Grant	5,000 0 0	4,998 16 3	1 3 9
19	Control of Animal Diseases and improvement of Livestock	5,100 0 0	4,648 8 3	451 11 9
20	Control of Plant Diseases and pests	9,500 0 0	6,482 16 3	3,017 3 9
21	Horticulture	3,500 0 0	3,217 4 1	282 15 11
22	Government House Garden	3,800 0 0	3,783 13 7	16 6 5
23	Department Contingencies	400 0 0	398 18 0	1 2 0
24	Marketing Investigations	500 0 0	358 17 1	141 2 11
25	Cold Storage Operation	5,000 0 0	2,275 5 11	2,724 14 1
26	Upkeep and operation of agricultural equipment and motor vehicles	5,000 0 0	4,996 16 11	3 3 1
27	Purchase of agricultural and reafforestation machinery and equipment	3,800 0 0	3,678 13 10	121 6 2
28	Purchase and storage of agricultural supplies	600 0 0	548 18 1	51 1 11
29	Purchase and storage of potatoes and other agricultural produce for resale	65,000 0 0	60,072 16 2	4,927 3 10
30	Agricultural Exhibition	3,000 0 0	3,000 0 0	0 0 0
31	Biological control and agricultural research	5,000 0 0	2,451 4 9	2,548 15 3
32	Reafforestation, roadside planting and maintenance of public parks and gardens	60,000 0 0	55,437 2 5	4,562 17 7
33	Publications	600 0 0	592 1 0	7 19 0
34	Grants for agricultural and horticultural extension work and agricultural education	750 0 0	474 8 9	275 11 3
35	Grant to Arbor Societies	200 0 0	81 0 0	119 0 0
36	Maintenance of School playing fields	4,500 0 0	3,686 5 0	813 15 0
37	Purchase of Motor vehicles	800 0 0	689 9 2	110 10 10
38	Sinking well and purchase of pumping equipment Montpelier Arboretum	1,500 0 0	1,496 15 6	3 4 6
39	Montpelier Arboretum — Repairs to Cottage	2,500 0 0	2,462 7 5	37 12 7
		£209,332 0 0	£188,559 17 5	£20,772 2 7

APPENDIX "C"

Statement of Expenditure and Receipts of Wholesale Marketing Centre.

EXPENDITURE

Salaries of Marketing Officer and Assistant	£ 2,062	0	0
Operation of Cold Storage Plant, labour, rent and electricity	2,925	0	0
Purchase of vegetables for resale	60,072	16	2
	£65,109	16	2

RECEIPTS

Sale of vegetables in 1960	£53,007	14	5
Stock in hand, 31st December 1960	2,362	0	0
Outstanding accounts 31st December 1960	3,226	0	0
	£58,595	14	5

APPENDIX "D"

Summary of Land Usage.

Vegetable Crops	650 acres
Fruit Crops	140 "
Flower Crops	40 "
Pasture Land	600 "
Fodder Crops	60 "
Bare fallow	20 "
	1,510 acres

APPENDIX "E"

Production of Ground Crops, Animal Products and Livestock Population.

VEGETABLES	Area under crop expr. in acres	Avg. yield per acre lbs.	Total yield in lbs.	Unit Value	Farm Value
Beans	35	4,000	140,000	1/6d	£ 10,500
Beets	10	8,000	80,600	7d	2,333
Broccoli	15	2,500	37,500	1/6d	2,872
Cabbage	40	10,000	400,000	7d	11,666
Carrots	55	12,000	660,000	8d	22,000
Onions	15	10,000	150,000	8d	5,000
Potatoes, Irish	240	8,000	1,920,000	6d	48,000
Potatoes, Sweet	40	8,000	320,000	6d	8,000
Tomatoes	40	9,000	360,000	1/4d	24,000
Miscellaneous	60	8,000	480,000	7d	14,000
Bananas	100	10,000	1,000,000	8d	32,500
	650		5,548,110		£180,871

CITRUS

Area under cultivation in acres	No. of trees	Avg. yield per trees in dozs.	Total yield in dozs.	Unit Value	Farm Value
80	8,000	15	120,000	5/0	£30,000

LILY BULBS AND FLOWERS

Area under cultivation in acres	No. of bulbs planted	No. of bulbs exported	No. of boxes of flowers exported	Value
12	500,000	Nil	3,890	£10,488

ANIMAL PRODUCTS

MILK

Total production expressed in gallons	Unit Value	Value
720,490	5/8	£204,138

MEAT PRODUCTS

Beef in lbs.	Value	Veal in lbs.	Value	Pork in lbs.	Value	Poultry in lbs.	Value
100,000	£7,500	11,900	£892	151,900	£15,290	30,000	£6,750

EGGS	Expressed in dozens	Unit Value	Value
	698,000	5/-	£174,500

DAIRY ANIMALS	Cows	Heifers	Bulls	Total
	1,300	250	45	1,595

HORSES

Farm and Truck	Carriage	Saddle Horses	Race Horses	Ponies	Total
80	38	20	25	20	183

PIGS	Sows	Boars	Store Pigs	Piglets	Total
	320	50	1,079	1,250	2,699

GOATS — 300

Printed in Bermuda
by the
Bermuda Mid Ocean News